(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 532 445 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **92610001.7**

(22) Date of filing: **07.01.92**

(51) Int. Cl.⁵: **D21H 19/64,** D21J 1/08

(30) Priority: **21.08.91 US 748031**

(43) Date of publication of application:
17.03.93 Bulletin 93/11

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU MC NL PT SE

(71) Applicant: **IMP- PAK PACKAGING CORPORATION**
1140 West Pender Street, Suite 1750
Vancouver, B.C, V6E 4G1 (CA)

(72) Inventor: **Spratt, Gordon William**
6145 Collingwood Street
Vancouver, B.C. V6N 1T5 (CA)
Inventor: **Birmingham, Brian Donald**
975 Montroyal Boulevard
North Vancouver, B.C. V7R 4G9 (CA)
Inventor: **Wong, John**
1753 Amblegreene Drive
White Rock, B.C. V4A 6H3 (CA)
Inventor: **Cunningham, Clarke**
3545 Wellington Crescent
North Vancouver, B.C. V7R 3B3 (CA)
Inventor: **Rimniceanu, Elizabeth**
51 South Warwick Avenue
Burnaby, B.C. V5B 3Y2 (CA)
Inventor: **Zepka, David**
502 Lymination Court
Louisville, Kentucky 40243 (US)
Inventor: **Bush, Nicholas**
607 East Main Street
New Albany, Indiana 47150 (US)
Inventor: **Wolfe, Norman**
202 Cheryl Drive
New Albany, Indiana 47150 (US)

(74) Representative: **Andersen, Henrik Rastrup et al**
c/o Plougmann & Vingtoft Sankt Annae Plads 11 P.O. Box 3007
DK-1021 Copenhagen K (DK)

(54) Process for forming paper-based products having cement-based coatings.

(57) A process for forming a moulded paper product which is degradable in a moisture active landfill is disclosed. The process involves providing a paper pulped paper feedstock, moulding the feedstock to produce a shaped product, drying the shaped product, applying a coating composition on to at least one surface of the shaped product, curing the coating composition and, optionally, hot pressing the resulting product to form a moulded paper product. When the moulded paper product is coated utilizing a particularly preferred coating composition described herein, which is comprised of a cement, at least one of a clay and a sulphate, an aqueous emulsion polymer, and preferably, at least one of an organic acid and a wax, it is readily degradable in a moisture active landfill.

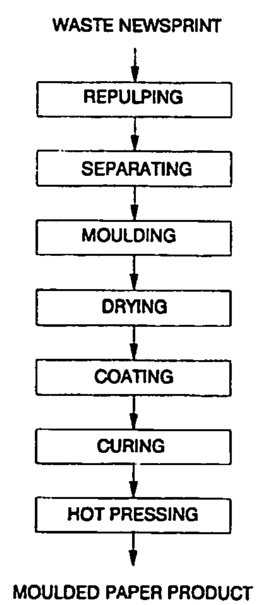

Figure 1

EP 0 532 445 A1

TECHNICAL FIELD

This invention relates to coating compositions and process for using the coating compositions. More particularly, this invention relates to cement-containing coating compositions which can be applied to paper products and the processes for preparing and coating these products.

BACKGROUND ART

In recent years, increasing concerns have been expressed about the use of plastic containers, such as styrofoam containers, in the food industry. Plastic containers, such as those used in grocery stores and fast food restaurants to package food, are not degradable and, as a result, are contributing to the fill-up of landfills. In addition, when some plastic containers are manufactured or burned, harmful compounds are released into the atmosphere which cause pollution or which damage the ozone layer. For example, styrofoam is usually foamed by using chlorofluorocarbon blowing agents such as Freon 11 and Freon 12, which can damage the ozone layer. Thus, during the manufacturing of styrofoam, chlorofluorocarbons are usually released into the atmosphere. In addition, when styrofoam is formed using chlorofluorocarbons, certain chlorofluorocarbon blowing agents will leak out of a styrofoam product during the life of the product. Due to these environmental concerns, there has been an increased interest in recent years in finding substitutes for food packaging plastic containers which are degradable and which do not result in the release of harmful substances when being manufactured or burned.

Although paper containers are degradable, a drawback to using paper containers instead of plastic containers for food is that paper absorbs moisture and grease leading to premature degradation of the container. Thus, in order for paper containers to be adequate substitutes for plastic containers, it is necessary to treat the surface of the paper containers to render them substantially moisture-resistant.

It is known that paper products and containers can be rendered moisture-resistant by coating them with various polymers. For example. United States patent No. 3,573,125 discloses that coatings comprised of ethylene-vinyl acetate and wax have been used for years in the packaging field to coat various substrates, including paper. United States patent No. 3,704,157 discloses that paper sheets adapted for packaging can be coated with a copolymer of ethylene and vinyl acetate to impart high moisture barrier properties. United States patent No. 3,298,855 discloses a moisture-resistant wrapping paper prepared by coating paper with blends of polyethylene latex and vinyl acetate copolymer latex. United States patent No. 3,305,383 discloses that the moisture permeability resistance of paper board substrates used to prepare cartons can be enhanced by employing coating compositions containing wax and a copolymer of ethylene and vinyl acetate.

One problem in using polymer coatings to render paper articles moisture resistant is that the polymer coatings serve as a barrier to moisture once the articles are buried in a landfill and thereby inhibit the natural and, at this point, desirable degradation of the paper article. However, once the polymer coating breaks down, the paper article can degrade more readily. Thus, there is a need for a polymer coating which can be applied to paper substrates to render them moisture resistant and which will readily degrade so as to permit the degradation of the substrate.

Various compositions containing cement are disclosed in the prior art. For example, United States patent No. 3,063,851 discloses a cement-based paint comprised primarily of Portland cement admixed with a non-aqueous vehicle made up of a small amount of resin dissolved in an organic solvent. The cement-based paint is used to waterproof masonry walls. United States patent No. 2,600,081 discloses a Portland cement-based paint that can be used to coat porous fibre-board material. The Portland cement-based paint contains methyl cellulose.

Several patents disclose the use of an ethylene-vinyl acetate copolymer in conjunction with cement. For example, a United States patent No. 4,434,257 discloses a cement composition which is comprised of a mixture of a conventional cement composition with an ethylene-vinyl acetate copolymer emulsion which contains a polyvinyl alcohol and a fatty acid ester of a polyvalent alcohol. The cement composition can be applied to buildings to improve water resistance.

United States patent No. 4,441,944 discloses a cementitious composition comprising a Portland cement, a polymeric emulsion and flyash. The composition can be foamed and applied to the surface of a sheet-like insulating board which can be made of fibrous cellulose.

United States patent No. 4,395,159 discloses a coating composition applied to a metal substrate to protect the substrate from deterioration. The coating composition comprises a cementitious material, such as Portland cement, a filler, a polymeric material, such as vinyl acetate polymers and copolymers, and chopped fibres.

United States patent No. 4,844,964 discloses that Portland cement can be mixed with water and an aqueous emulsion of polymers, such as ethylene vinyl acetate copolymers, and then used to prepare a signboard.

The prior art also discloses that various acids may be employed to retard the setting time for cement. For example, United States patent No.

4,892,586 discloses various organic acids or salts thereof which may be used as retarders for the setting or solidification of cements. United States patent No. 2,470,505 discloses that maleic acid can be added to a cement slurry to act as a retardant to lengthen the stiffening time. United States patent No. 4,054,461 discloses that hydroxypolycarboxylic acid may be used as a retarder in a cement composition, and United States patent No. 3,188,221 discloses that some organic acids may be used as retarding agents for retarding the setting time of cement. Canadian patent No. 638,274 discloses a cement product containing Portland cement and fatty acids.

However, none of the above-mentioned patents discloses a coating composition which can be applied to a paper substrate to render the substrate moisture resistant during the substrate's useful life but which will readily degrade once the substrate is discarded, such as in a landfill, so that the paper substrate can then degrade and disintegrate.

DISCLOSURE OF THE INVENTION

It is an object of the present invention to provide a novel process for preparing a moulded paper stock product which obviates or mitigates at least one of the above-mentioned deficiences of the prior art.

Accordingly, the present invention provides a process for preparing a moulded paper product, the process comprising the steps of:

(a) providing a pulped paper feedstock;

(b) moulding the pulped paper feedstock to produce a shaped product;

(c) drying the shaped product;

(d) applying a coating composition on to at least one surface of the shaped product; and

(e) curing the coating composition.

The process generally comprises providing a pulped paper feedstock, moulding the feedstock to produced a shaped product; drying the shaped product; coating the dried, shaped product with a coating composition; curing the coating composition; and, optionally, hot pressing the cured coated product. Depending on the nature of the coating composition, once the coated product is discarded in a moisture active landfill, the coating will begin to break down, thereby allowing the paper substrate to degrade. The coating composition suitable for use in the present process is not particularly restricted and is preferably degradable to some extent. Prefereably, the coating composition is comprised of a cement, at least one of a clay and a sulphate and an aqueous emulsion polymer. More preferably, the coating composition further comprises at least one of an organic acid and a wax.

The choice of pulped paper feedstock for use in the present process is not particularly restricted nor is the manner by which it is obtained. Preferably, the pulped paper feedstock is repulped newsprint or other paper-based waste. The following detailed description of an embodiment of the present invention is provided in the context of using a pulped paper feedstock including a repulped newsprint or other paper-based feedstock; however, it will be appreciated that the invention is not limited solely to such a feedstock.

An embodiment of the present invention will be described with reference to the attached Figure in there is illustrated a block diagram of the present process. As shown in the Figure, waste newsprint is repulped, separated, moulded, dried, coated, cured and hot pressed to produce a moulded paper product.

The stock which is used for coating with the composition of the instant invention is preferably a moulded pulp stock which is derived from waste paper, more preferably from waste newsprint and corrugated liner. Of course, virgin pulp and pulp screenings may also be used. In general, the waste paper is received in bulk and manually sorted to remove glossy printed papers which are difficult to recycle. After sorting, the selected waste paper is transferred by conveyor into a batch repulper, where it is mixed with water, rosin (which is used to size the paper) and an emulsified wax to help reduce moisture absorption. Within the batch repulper, the waste paper is beaten into a uniform consistency with a measured quantity of recycled water to produce a pulped paper feedstock having a solids content in the range of about 2 to about 10 percent by weight, preferably from about 3 to about 5 percent by weight.

In general, the amount of rosin used is in the range of from about 0.5 to about 2 percent by weight, preferably from about 1 to about 3 percent by weight. The emulsified wax is added in the range of from about 0.5 to about 2 percent by weight, preferably from about 1 to about 3 percent by weight. The preferred emulsified waxes are paraffin based, although any waxes which are compatible with the stock solution herein may be used. The stock is maintained in the batch repulper at a temperature which is normally slightly above ambient conditions, generally in the range of from about 80°F to about 115°F, preferably from about 90°F to about 100°F for about 30 to about 45 minutes or until the fibre is broken down and is in the form of a pulp.

The repulped waste paper stock is then pumped into a raw stock tank where it is held for further processing. From there, the raw stock is pumped into a high density separator to remove debris and other contaminants. Next, the raw stock may or may not be passed over a screen where lumpy material is removed. The lumpy material may then be processed through a refiner and combined with the acceptable material from the screen which together are then pumped to a refined stock tank where they are held for further processing at a slightly lower solids content than the raw stock storage.

The refined material and the material from the

high density separator which is not in need of refining are pumped into a tank where they are blended with recirculated water, aluminum sulphate in the range of up to about 1 percent by weight to improve the ability of the rosin to size the paper stock, a defoamer in the range of from about 1 to about 10 parts per million by weight, and other necessary ingredients, depending upon the end use. Examples of other ingredients include fillers, additives such as clays, including kaolin, calcium carbonate, as well as polymer de-watering enhancers such as cationic starch. The blended material produced in this step is then suitable for use as pulped paper feedstock in the present process.

The blended material, in this instance the pulped paper feedstock for the present process, is then transferred to the moulding vat where additional water is added to reduce the solids content to from about 0.3 to about 2.0 percent by weight, preferably from about 0.5 to about 1.0 percent by weight. In the moulding vat, the pulp stock is continuously recirculated as it is exposed to the vacuum moulder which is designed to form the product to be utilized. In general, particularly with small items such as food trays, the moulder will form large size assemblies containing multiple units of the item to be formed. For example, with food trays the overall size of the assembly is about 14 x 25 inches and contains about 3-9 food trays per assembly. The moulding machine itself comprises, in addition to the moulding vat, the vacuum moulder and the transfer dye mechanism. The vacuum moulder consists of a moulding drum, preferably having several faces containing dyes having the shape of the desired product. As the drum rotates, each face in succession is dipped into the pulp stock. A vacuum system attached to the rotating drum causes the fibres contained in the pump stock to be deposited onto the forming dyes on the face of the drum as the water in which the fibres are suspended is drawn through the dyes and drained out. During the moulding operation the fibres orient in a mechanically-interlocked layer to form the moulded product. The removed water is recycled for further use. As the moulding drum continues to rotate, at a point just prior to re-entry into the vat, a rotating transfer dye mates with the moulded face on the drum and, under suction, removes the wet moulded product, depositing it on a conveyor line. Moulders of the type which may be used in the present process are further described in United States patent No. 3,661,707.

The wet moulded product is then transferred into a dryer where it is dried for a period of time and under temperature conditions which are adjusted depending upon the size, shape and end use of the particular product being moulded. In general, for paper trays, the product is dried at an oven temperature in the range of from about 375°F to about 500°F, preferably from about 400°F to about 450°F, for period of time in the range of from about 10 to about 30 minutes. Preferably, as the product leaves the dryer, it will have achieved a surface temperature of from about 180°F to about 230°F.

After exiting the dryer, the product may be coated with a coating composition using one of several coating application techniques as described above. However, the preferred method involves spray coating. In order to minimize moisture and coating absorption, the tray assembly is reheated immediately before coating in an oven at the same temperature described above so that the temperature of the assembly is again elevated to a value in the range of from about 190°F to about 230°F. After one side of the tray assembly is coated, the assembly is then reheated to about 190°F and the second side is coated. Preferably, the back or rough side of the tray assembly will be coated to a 3 mil dry film thickness while the front or smooth side will be coated to about a 1.5 mil dry film thickness. While the coating processes which are employed, as pointed out above, may vary, it is preferred to use a two-step spraying process employing an air-assisted, low pressure spray followed by an electrostatic spraying.

As described above, in addition, different coatings may be applied to the front and to the back of the article and multiple coatings may be applied, depending upon the particular end use.

After the assembly is coated, it is preferably passed through a 350°F to 500°F curing oven where it is maintained for a period of from about 30 seconds to several minutes, all again depending upon the coating composition and the desired end use involved.

After curing, the assembly may then be hot-pressed using a standard press for a period of from about 0.2 to about 2 seconds, at temperatures ranging between about 250°F and about 400°F, and at a pressure of from about 50 to about 250 psi. The purpose of hot-pressing is to smooth the coating and to add gloss. After the coated assembly leaves the hot press it is then, in the preferred instance, disassembled by cutting, stacked and stored for shipment.

The preferred coating composition suitable for use in the present process comprises a cement, more preferably white Portland cement.

The preferred coating composition also preferably comprises a clay. The clay should be of extremely fine particle size and should consist of one or more clay minerals, including hydrosilicates of aluminum, iron or magnesium. Most preferred among the clays are the kaolin clays which include kaolinite dickite and halloysite-endellite. Clays are well known in the art and the appropriate clay for use in the preferred coating composition would be apparent to a person skilled in the art.

In addition to the clay, another component of the preferred coating composition for use in the present process is a sulphate, preferably, an alkali or alkaline

earth metal sulphate, and most preferably, calcium sulphate.

The cement, clay and sulphate suitable for use in the preferred coating composition are readily available commercially.

The preferred coating composition also contains an aqueous emulsion polymer which, preferably, has FDA (or other appropriate governmental) approval, if the finished product is to be used in a food-type application. Any aqueous emulsion polymer which will impart water resistance to a paper substrate may be employed as long as it will not be degraded or otherwise break down at a relatively high pH or in the presence of a cement. Preferably, the polymer is a carboxyl functional emulsion polymer, such as acrylic, polyester, epoxy, vinyl, vinyl acetate, ethylene-vinyl acetate, or epoxy ester polymer or copolymer. Most preferably, the emulsion polymer is an ethylene-vinyl acetate aqueous emulsion copolymer.

The ethylene-vinyl acetate copolymers which are suitable can be prepared by copolymerizing a mixture of ethylene and vinyl acetate in the presence of a free-radical catalyst. Suitable ethylene-vinyl acetate emulsion compositions are readily available commercially. One example of a suitable emulsion copolymer is Airflex™ 100 HS latex, available from Air Products and Chemicals, Inc.

The preferred coating composition for use in the present process more preferably further comprises a wax, most preferably a wax emulsion, to aid in press release and to retard water and other moisture absorption. The waxes which may be used herein may either be synthetic or naturally occurring. However, in order for the wax to carry out its intended function, it is important that the wax not degrade in the presence of other components in the coating composition. Among the waxes which may be used are included naturally occurring waxes such as esters of long chain fatty alcohols and acids, petroleum and mineral waxes. Among the common waxes which may be used are the vegetable waxes such as carnauba wax, candelilla wax, and hydrogenated candelilla wax. Other waxes include the synthetic waxes such as polyethylene waxes and paraffin waxes, these latter waxes being preferred.

The preferred coating composition more preferably further comprises an organic acid, such as maleic, stearic, potassium hydrogen tartrate or oleic acid or any organic sugar such as corn syrup, which serves to retard the setting time of the coating compositions. Difunctional acids are preferred. The presence of an organic acid in the coating composition helps to prolong the pot life and to make it easier to spray the composition onto a degradable substrate such as a paper substrate.

In addition to the above-described components, the coating composition may contain conventional fillers, additives, thickeners, defoamers and pigments. Since the cement coating composition can be readily applied to paper substrates, such as vacuum moulded pulp food trays, and since pigments can be readily added to the coating composition, the coating composition provides a relatively easy means for colouring the surface of a paper substrate a particular colour.

Preferably, the coating composition is prepared by first combining the clay, the sulphate, the acid and the aqueous emulsion polymer in water. The cement should be added shortly before the coating composition is applied to a paper substrate because the coating composition has a pot life of up to 24 hours once the cement is added.

Generally, the preferred coating composition will contain from about 40 to about 90 percent by weight cement, preferably from about 50 to about 75 percent by weight; from 0 to about 20 percent by weight of a clay, preferably from about 2 to about 10 percent by weight; from 0 to about 20 percent by weight of sulphate, preferably from about 1 to about 15 percent by weight; and from about 6 to about 60 percent by solids weight of the aqueous emulsion polymer, preferably from about 10 to about 40 percent by weight; with the proviso that at least one of the clay and the sulphate are actually present in the composition. All weights are based upon the total solids weight of aqueous emulsion polymer, cement, sulphate, and clay in the coating composition.

In the event an organic acid or sugar is added, it should be added in an amount in the range of from about 1 to about 20 percent based on the above compositional weight. In the event a wax is added, it should be added in an amount in the range of from about the 1 to about 25 percent by weight solids level based on the above compositional weight.

In order for the paper substrate to disintegrate after it is discarded, it is necessary for the coating composition to break down and degrade so that the paper substrate can degrade. The intact cement coating serves as a protective coating for the paper substrate thereby inhibiting premature disintegration of the paper substrate. Once the cement coating begins to break down and degrade, the paper substrate can also begin to degrade.

Disintegration of the coating composition, and thus of the paper substrate, will occur when the degradable coating is placed on at least one side of the paper substrate. Faster disintegration, of course, will occur when both sides of the paper substrate are coated with the degradable coating. However, it is possible to coat one side with the degradable coating described herein and another side with a more conventional coating or a less degradable coating. In general, with food products a less degradable or non-degradable coating is placed on the side of the paper which will be exposed to the food product and the reverse side is coated with the composition described

herein. The partially degradable compositions which may be used in conjunction with the coating compositions described otherwise herein simply involve the use of higher percentages of the coating composition of the emulsions described herein and lesser amounts of the cement and other components. When the cement and other components are totally removed, of course, the coating composition becomes essentially non-degradable.

A particularly preferred coating composition which still maintains certain degradative properties but which exhibits heightened resistance to liquids, generally, and food liquid specifically, involves a coating composition comprising: from about 15 to about 60 percent by weight of a cement; from about 40 to about 75 percent by weight on a solids basis of aqueous emulsion polymer; from 0 to about 20 percent, preferably from about 1 to 20 percent of sulphate; and from 0 to about 10 percent, preferably from about 1 to 10 percent of a clay, all as described above.

The coating composition used in the present process may be applied by conventional spraying or airless spraying, with or without electrostatic assist. In addition, electrostatic discs may be used to apply the coating compositions during the present process.

Although not wishing to be limited to any particular theory or mode of the degradation the cement in the preferred coating composition, it is believed that the sulphate (e.g. calcium sulphate) in the preferred coating absorbs water and forms a complex with the kaolin which causes the cement to form a slush and the dried coating to break down. As a result of the presence of the sulphate, kaolin and cement in the preferred coating, the coating will readily degrade and decompose within a few years in a moisture, and preferably biologically, active environment such as a landfill, thereby allowing the paper substrate also to degrade.

Since the preferred coating composition for use in the present process is substantially non-toxic, it may be used to coat paper articles for food storage, such as vacuum moulded paper food trays used in the fast food industry. The paper containers coated with the coating composition have a semi-lustrous finish and smooth surface texture and are resistant to food juices and moisture.

Embodiments of the present invention will be described with reference to the following Examples which are provided for illustrative purposes only and should not be used to limit the scope of the invention. In the following Examples, all parts are by weight, unless otherwise specified.

Example 1

Components A and B were prepared as follows:

Component A

24.39 parts water were blended under agitation with 0.41 parts of a Natrosol™ 330 thickener available from Aqualon Co., 0.96 parts of Tamol™ 850 surfactant available from Rohm & Haas Co., 0.30 parts of ammonium hydroxide and 0.54 parts of Drewplus™ L140 defoamer available from Drew Chemical. Also added with agitation were 16.8 parts of Kronos™ 2020 titanium dioxide available from Kronos, Inc., 2.57 parts of Hitox™ titanium dioxide available from Hitox Corporation of America, along with 2.57 parts of burnt umber pigment and 14.98 parts of calcium carbonate. 20.74 parts of water, 127.99 parts of Airflex 100, an EVA emulsion (aqueous emulsion polymer) available from Air Products & Chemicals Company and 90. 17 parts of Michemlub™ 368, a wax emulsion available from Michelman Chemical Co. were then added to the mixture.

Component B

17.95 parts of water were blended with 7.11 parts of corn syrup, 3.66 parts of ammonium hydroxide, 9.33 parts of potassium hydrogen tartrate, 9.33 parts of Tamol™ 850, 24.70 parts of Huber™ 35, a kaolin clay (clay), 9.89 parts of calcium sulphate (sulphate), and 1.08 parts of Drewplus™ L140. To this mixture was added a total 156.88 parts of tap water, and 459.88 parts of white Portland cement type I (cement).

Components A and B were then mixed together and exhibited a pot life of two hours. Over this period of time the mixture could readily be applied to reconstituted paper or cardboard flats by spraying as well as by other conventional coating means.

A coating of the Component A and Component B mixture was sprayed to a thickness of 3 mils on reconstituted paper plates using, in one case, a standard spray gun and, in another case, an electrostatic disc. The plates were dried in a 350°F oven. The plates were then placed in a platen press and heated at a temperature of 100° C and under 100 psi for about 1 second. A uniform, smooth coating resulted. The coatings degraded when placed in a moisture active landfill, i.e., a landfill containing sufficient moisture to degrade the coating in question over time.

Example 2

A two-component coating composition was prepared as follows:

Component A

69.12 parts of water were mixed with 1.50 parts of Natrosol™ 330, 2.73 parts of Tamol™ 850, 0.30 parts of ammonium hydroxide, 1.54 parts of Drew-

plus™ L140 defoamer. Added to this mixture under agitation were 47.62 parts of Kronos™ 2020, 7. 30 parts of Hitox™ titanium dioxide, 0.96 parts of burnt umber pigment, 42.46 parts of calcium carbonate, 58.77 parts of water, 362.70 parts of Airflex™ 100 emulsion, and 255.54 parts of wax emulsion.

Component B

3.58 parts of water were mixed with 1.52 parts of corn syrup, 0.79 parts of ammonium hydroxide, 2.0 parts of potassium hydrogen tartrate, 2.0 parts of Tamol™ 850, 5.30 parts of Huber™ 35 clay, 2.13 parts of calcium sulphate, and 0.23 parts of Drewplus™ L140. Added for viscosity control were 33.65 parts of water. Finally 98.64 parts of white Portland cement type I were added to the mixture.

Components A and B were blended and sprayed to a thickness of 5 mil on a reconstituted paper plate stock, dried and cured as in Example 1. The reverse side of the plate was sprayed, dried and cured with the blend described in Example 1.

The coated plates were then brought in contact with meat products. The inside coating using the Example 2 composition showed excellent resistance to the meat product. When the coated plate is exposed to a moisture active landfill, it degraded.

As can be seen, the Example 2 blend contains a much higher level of emulsion than does Example 1 so as to retard food liquid penetration of the cardboard stock. On the other hand, the material prepared in Example 1 is much more readily degradable because of its high concentration of cement and its relatively low amount of emulsion polymer.

Claims

1. A process for preparing a moulded paper product, the process comprising the steps of:
   (a) providing a pulped paper feedstock;
   (b) moulding the pulped paper feedstock to produce a shaped product;
   (c) drying the shaped product;
   (d) applying a coating composition on to at least one surface of the shaped product; and
   (e) curing the coating composition.

2. The process defined in claim 1, wherein the pulped paper feedstock is substantially free of any undesirable materials.

3. The process defined in claim 1, further comprising the step of:
   (f) hot pressing the coating composition after curing to produce a hot pressed product.

4. The process defined in claim 3, further comprising the step of:
   (g) cutting and trimming the hot pressed product.

5. The process defined in claim 1, wherein step (b) comprises moulding the pulped paper feedstock on a vacuum moulder.

6. The process defined in claim 1, wherein step (c) comprises drying the shaped product at a temperature in the range of from about 375°F to about 500°F and step (e) comprises curing the coating composition at a temperature in the range of from about 350°F to about 500°F.

7. The process defined in claim 3, wherein step (f) the hot pressing comprises hot pressing the coating composition at elevated temperature.

8. The process defined in claim 1, wherein the moulded product is a product for use with food.

9. The process defined in claim 1, wherein the pulped paper feedstock comprises waste paper.

10. The process defined in claim 1, wherein the coating coating composition comprises:
    (a) a cement;
    (b) at least one of a clay and a sulphate; and
    (c) an aqueous emulsion polymer which is substantially stable in the presence of the other components in said coating composition.

11. The process defined in claim 10, wherein both of the clay and the sulphate are present.

12. The process defined in claim 10, wherein the coating composition further comprises at least one of a wax, an organic acid and a sugar.

13. The process defined in claim 1, wherein the coating composition:
    (a) from about 40 to about 90 percent by weight of said cement;
    (b) from 0 to about 20 percent by weight of said clay;
    (c) from about 0 to about 20 percent by weight of said sulphate; and
    (d) from about 6 to about 60 percent by weight of said emulsion polymer;

    all based on the total weight of said cement, said clay, said sulphate and the solids weight of said emulsion polymer.

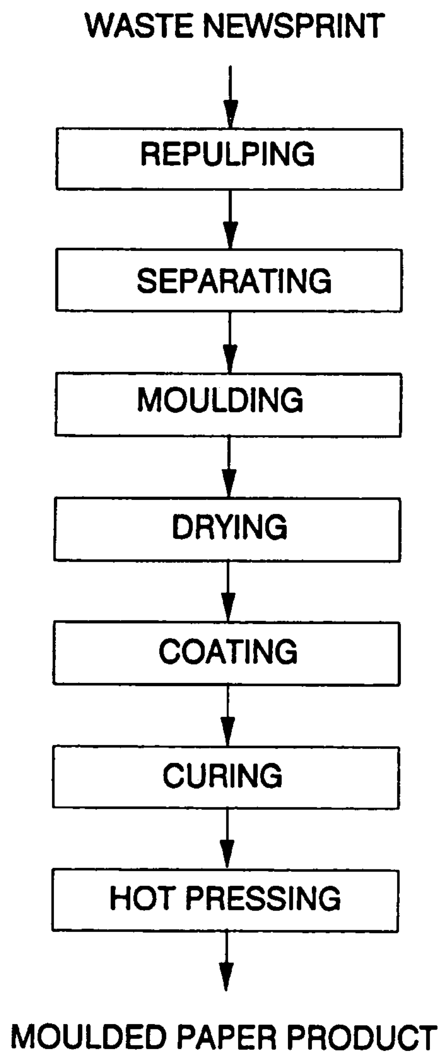
WASTE NEWSPRINT
REPULPING
SEPARATING
MOULDING
DRYING
COATING
CURING
HOT PRESSING
MOULDED PAPER PRODUCT

Figure 1

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 92 61 0001

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-2 236 900 (H.W.GREIDER) * column 1, line 22 - column 4, line 21; claims 1-8 * -----	1-13	D21H19/64 D21J1/08
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D21H D21J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	22 DECEMBER 1992	FOUQUIER J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document